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(19) (CA) **CANADIAN PATENT** (12)

(54) Block for the Construction of Retaining Walls

(72) Hamel, André,
Hamel, Denis,
Canada

(73) Granted to Montco Ltée
Canada

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Canada

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BACKGROUND OF THE INVENTION

The present invention relates to the construction of retaining walls and is more particularly concerned with a concrete block for use in the strengthening of terraces, embankments and banks, the protection of gardens, slopes, underpasses and road embankments as well as in noise protection mounds.

Concrete blocks specifically designed for the construction of retaining walls are already known. For example, Canadian Patent No. 1,116,422 discloses an earth retaining wall formed by stacked, alternately staggered rows of spaced, nesting, chevron-shaped concrete blocks. Each block is formed on its upper side with a dihedral protrusion and on its underside with a complementary dihedral recess such that the blocks may lie one upon the other without mortar connection and interlock with one another due to their roof-shaped angular configuration. The underside of each block is also narrower than the upper side so as to provide step-like shoulders in the wall assembly for good anchorage with the earth. However, when it is desired to form a relatively high retaining wall, the blocks of some of the courses must be connected with one another using connection tubes which pass into holes formed in the blocks and extend continuously through the blocks in the direction of the courses; the blocks are then anchored to the bank with earth ties

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attached either directly or indirectly to the connection tubes and extending into the bank.

It has been found in practice that when stacking the blocks described above, it is difficult to align the blocks with each other so as to provide complete contact engagement between the recess of a given block and the protrusion of an underlying block, and there is thus often a gap between two blocks arranged one upon the other. Even if a block is properly fitted upon another one, it may still be displaced in a direction normal to the course when a force of relatively small magnitude is applied to the block in such direction. Moreover, due to the particular configuration of the blocks, it is not possible to provide different wall arrangements which would add to the aesthetic look of the wall.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to overcome the aforementioned drawbacks and to provide a block for the construction of a retaining wall, which is self-aligning.

It is a further object of the invention to provide a block of the above type which combines stability, aesthetic value and versatility.

It is yet another object of the invention to provide such a block which is easy to install and adaptable to a variety of terrains.

In accordance with the present invention, there is provided a block for the construction of a

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retaining wall, comprising a body of concrete material having upper and lower faces of like contour, each face being formed with a pair of dihedral protrusions and a pair of dihedral recesses, the protrusions and recesses alternating with each other and extending in parallel relationship. The protrusions and recesses of the upper face are complementary to the recesses and protrusions respectively of the lower face to define upper and lower bearing surfaces. A retaining wall may thus be formed by arranging a plurality of these blocks in courses one above the other with the protrusions and recesses defining the lower bearing surface of a block interfitting respectively with the recesses and protrusions defining the upper bearing surface of an underlying block, the protrusions and recesses permitting self-alignment of the blocks while preventing displacement thereof in a direction normal to the courses.

20 Owing to the provision of two dihedral protrusions and two dihedral recesses on each of the upper and lower faces of the concrete block according to the invention, the block when laid upon another one will slide in place as a result of its own weight and thus complete contact engagement will be ensured between the protrusions and recesses defining the lower bearing surface of the block and the respective complementary recesses and protrusions defining the upper bearing surface of the underlying

30 block. Moreover, since these protrusions and recesses

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provide a double interlocking engagement between two superposed blocks, the blocks in the wall assembled position are very stable and they can be displaced relative to one another in a direction normal to the courses only with great difficulty, usually requiring a force of relatively high magnitude.

BRIEF DESCRIPTION OF THE DRAWINGS

Further features and advantages of the invention will become more readily apparent from the following description of a preferred embodiment thereof as illustrated by way of example in the accompanying drawings, in which:

Figure 1 is a perspective view of a concrete block according to the invention;

Figure 2 is a sectional view of the block shown in Fig. 1;

Figure 3 which is on the same sheet of drawings as Fig. 1 is a sectional view of an earth retaining wall constructed with the blocks of Fig. 1; and

Figure 4 is a sectional perspective view of another wall assembly which may be effected using the blocks of Fig. 1.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring first to Figs 1 and 2, there is shown an elongated concrete block generally designated by reference numeral 10 and having upper and lower faces 12 and 14 as well as opposite end faces 16 and 18, the upper and lower faces having substantially the same length. The block 10 is specifically designed for the construction of retaining walls and is made of concrete

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material having a minimum strength of 48 Mpa (7,000 lbs/sq. inch).

The upper face 12 of the block is formed with a pair of dihedral protrusions 20, 22 and a pair of dihedral recesses 24, 26. The lower face 14 is similarly formed with a pair of dihedral protrusions 28, 30 and a pair of dihedral recesses 32, 34. As shown, the protrusions and recesses of each of the upper and lower faces alternate with each other and extend in parallel relationship in a direction normal to the longitudinal axis of the block. Moreover, the protrusions 20, 22 and recesses 24, 26 of the upper face 12 are complementary to the recesses 32, 34 and protrusions 28, 30 respectively of the lower face 14 to define upper and lower bearing surfaces, and are disposed in vertical alignment therewith. Each of these protrusions and recesses forms a dihedral angle of about 130° . As best shown in Fig. 2, one of the planar surfaces defined by each protrusion forms an angle α of about 15° to the horizontal, the other planar surface forming an angle β of about 30° to the horizontal.

On the other hand, the end face 18 of the block 10 is planar and is joined to the upper and lower faces 12 and 14 by chamfered edges 36. The other end face 16 is toothed and formed with an angular shoulder 38.

Figure 3 shows how the blocks 10 may be stacked vertically to form a retaining wall for an earth bank 40. Since the upper and lower faces

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12 and 14 of each block have like contour, a block can be inverted so that its surface 12 faces downwardly and thus be positioned over another block with its surface 12 abutting the top surface 12 of the underlying block. It is therefore possible to arrange some of the blocks 10 in courses so that their planar end surfaces 18 face outwardly and their toothed end surfaces 16 face the earth 40, and to arrange other blocks in courses so that their planar end surfaces 18 face instead the earth and their toothed end surfaces 16 face outwardly, whereby such courses can be alternated as shown in Fig. 3. This of course renders the blocks 10 quite versatile and adds to the aesthetic look of the resulting wall.

The retaining wall may be constructed on a concrete footing 42 embedded in the earth. When it is desired to construct a vertical wall of relatively low height, for instance having a height of up to about 4 feet, the first course of blocks 10 can be laid directly on the horizontal top surface of the footing 42. When the first course has been laid, the wall may then be erected by arranging the blocks in further courses one above the other according to the desired pattern. As shown in Fig. 3, the protrusions and recesses of the blocks interfit with each other to provide complete contact engagement between the superposed blocks, and also provides a double interlocking engagement therebetween which prevents displacement of the blocks in a direction

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normal to the courses. The angular shoulders 38 further provide good anchorage with the earth 40.

In the case of relatively high retaining walls, the wall must be angularly inclined as shown

5 in Fig. 4. To this end, the first course 44 of blocks 10 is laid with butt joints in the still unset soft concrete of the footing 46 and pressed therein to provide the desired inclination of the retaining wall. The blocks of the upper courses 48
10 can be arranged with open joints to form interspaces 50 which can receive decorative plants. The blocks 10 can also be arranged with closed joints as in the two uppermost courses 52 shown in Fig. 4. For maximum safety, the last course is usually set in
15 place with mortar.

Although the retaining wall is illustrated in Fig. 4 with the planar end surfaces of the blocks all facing outwardly, it is apparent that such a wall can also be constructed with the toothed end
20 surfaces of the blocks all facing outwardly.

Finally, it should be noted that a retaining wall constructed with the blocks 10 is held in place solely by the equilibrium existing between the weight of the wall and the pressure exerted
25 by the earth bank 40. Since the thickness and unitary mass of the blocks making up the wall remain unchanged as the height of the bank increases, it is thus necessary to increase the angle of inclination of the wall in order to maintain this equilibrium
30 and compensate for the pressure which increases with

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height. This inclination generally varies from
about 90° to about 60° .

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A block for the construction of a retaining wall, comprising a body of concrete material having upper and lower faces of like contour, each said face being formed with a pair of dihedral protrusions and a pair of dihedral recesses, said protrusions and recesses alternating with each other and extending in parallel relationship, the protrusions and recesses of the upper face being complementary to the recesses and protrusions respectively of the lower face to define upper and lower bearing surfaces, whereby said retaining wall is formed by arranging a plurality of said blocks in courses one above the other with the protrusions and recesses defining the lower bearing surface of a block interfitting respectively with the recesses and protrusions defining the upper bearing surface of an underlying block, said protrusions and recesses permitting self-alignment of the blocks while preventing displacement thereof in a direction normal to said courses.

2. A block as claimed in claim 1, wherein the protrusions and recesses defining said upper bearing surface and the respective complementary recesses and protrusions defining said lower bearing surface are vertically aligned with each other when said block is disposed in a vertical wall assembly.

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3. A block as claimed in claim 1, wherein said body is elongated in a direction normal to said parallel protrusions and recesses and has opposite end faces, one of said end faces being planar.

4. A block as claimed in claim 3, wherein the other end face of said body is formed with an angular shoulder.

5. A block as claimed in claim 3, wherein said upper and lower faces are joined to said planar end face by chamfered edges.

6. A block as claimed in claim 1, wherein each of said protrusions and recesses forms a dihedral angle of about 135° .

7. A block as claimed in claim 6, wherein one of the planar surfaces defined by each said dihedral protrusion forms an angle of about 15° to the horizontal, the other planar surface forming an angle of about 30° to the horizontal.

8. A block as claimed in claim 1, wherein said body is made of concrete having a minimum strength of 48 Mpa.

9. A block as claimed in claims 3, 4 or 5, wherein said upper and lower faces have substantially the same length.

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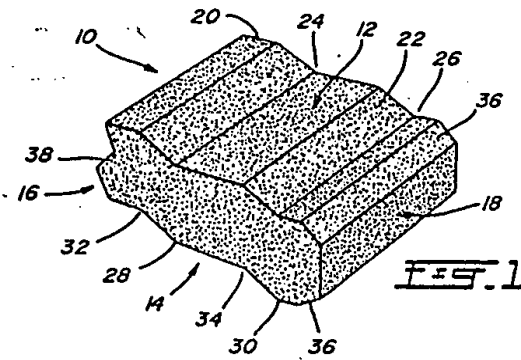


FIG. 1

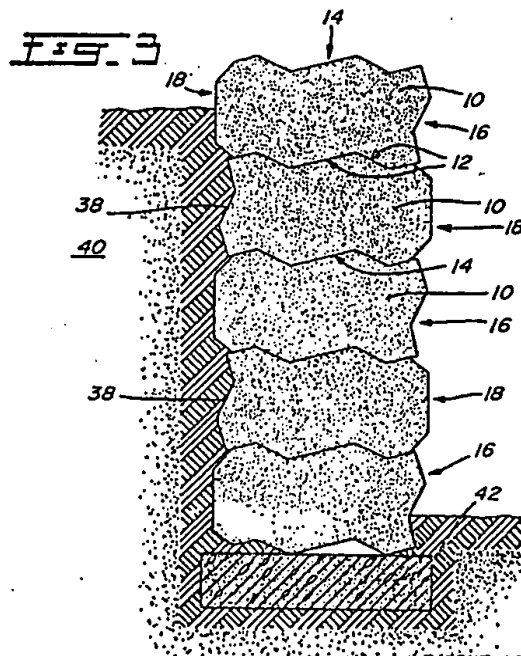


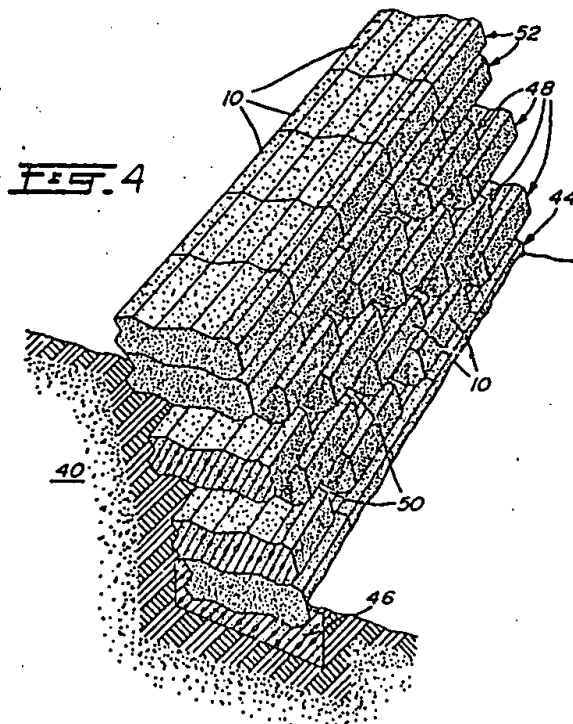
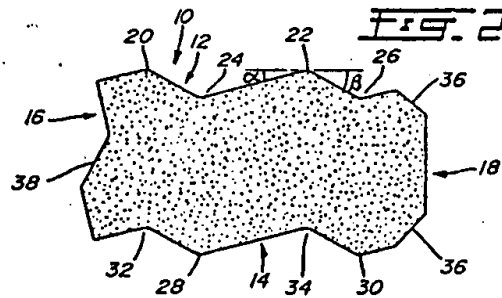
FIG. 3

PATENT AGENTS

Swaney, Mitchell, Houle,
Minneapolis, Minn.

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PATENT AGENTS

Swaney, Mitchell, Houle,